NASR-162

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ARAC OPERATING MANUAL

CR 52,472

Describing

ARAC SERVICES TO MEMBER COMPANIES

(Third Edition)

GPO PRICE $ _____

OTS PRICE(S) $ _____

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ARAC OPERATING MANUAL —

describing

ARAC SERVICES TO MEMBER COMPANIES

(Third Edition)

[redacted]

October, 1963

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SECTION 1 - ARAC OPERATIONS

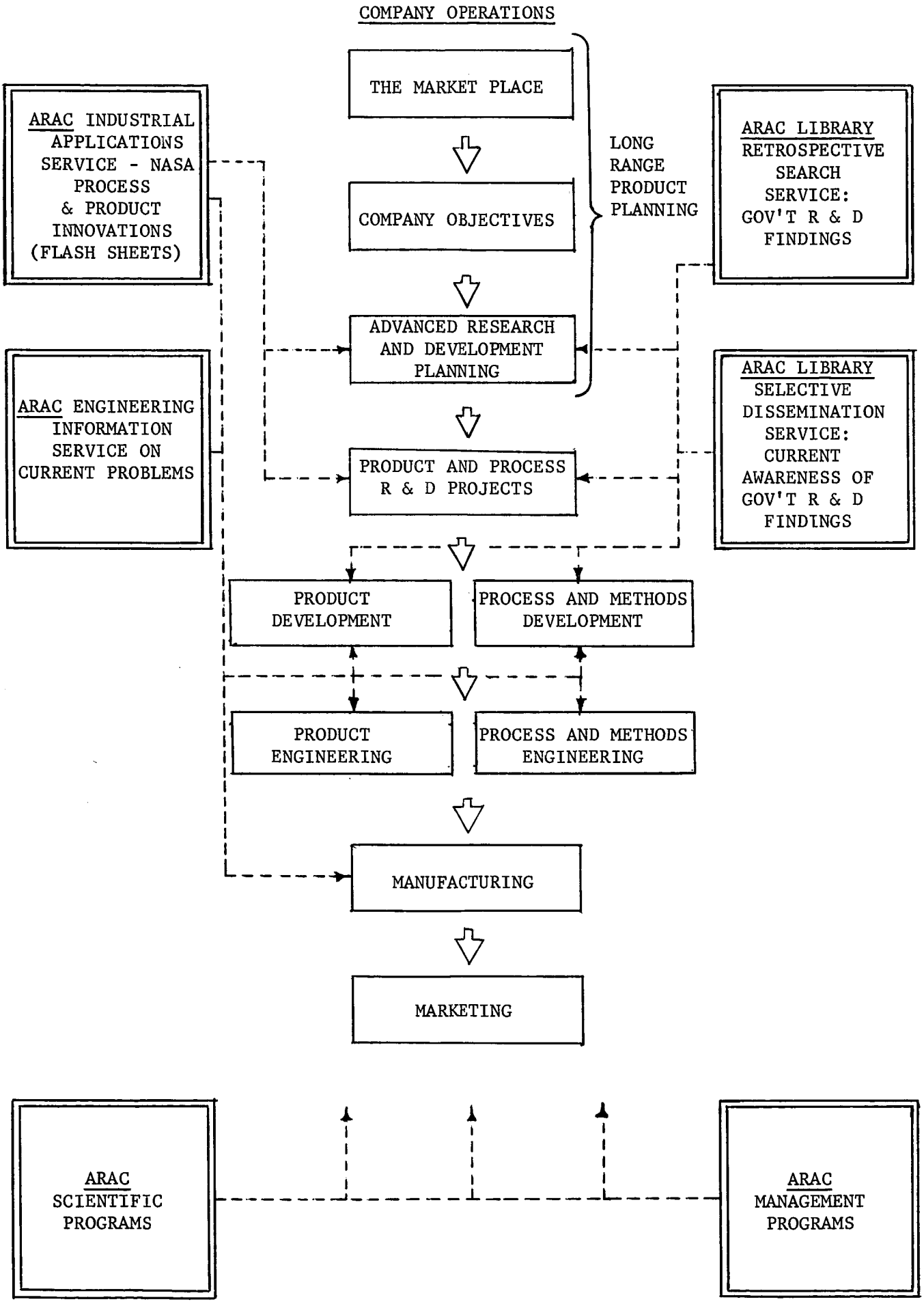
The services provided by ARAC are shown in the following diagram, ARAC SERVICES IN COMPANY OPERATIONS. In this diagram, ARAC services are shown as they relate to the progression of company tasks from the identification of new markets and market segments, through advanced product planning, R & D planning, execution of R & D projects, product and process development, final engineering, manufacture, and marketing. The diagram is offered simply as a guide to the use of ARAC services by member companies.

In the following sections of this manual, each ARAC service is described simply and briefly. Member company management and technical personnel are urged to familiarize themselves with ARAC service procedures so that their use becomes automatic in company operations.

Following the diagram is a page listing the names, titles, and telephone numbers of ARAC staff members. The last page of this section lists ARAC member companies as of the date of publication of this manual.

October, 1963

ARAC SERVICES IN COMPANY OPERATIONS



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337-5464	Ralph E. Cleland	Co-Director
337-7968	A. M. Weimer	Co-Director
337-7970	Howard L. Timms	Associate Director for Operations
337-3462	William L. Haeberle	Associate Director for Development
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ME 5-8431	Doris H. Merritt	Assistant Director for Science
337-5656	Nevin W. Raber	Technical Librarian
337-2065	E. W. Martin, Jr.	Director, I.U. Computer Center
337-8108	David W. Cravens	Assistant Director for Operations
337-8108	Gene K. Groff	Assistant Director for Research Programs
337-8260	James R. Hubbell	ARAC Representative, I.U. Computer Center
337-8260	Ralph Sprague	Research Assistant - Computer Operations
337-5656	Elizabeth Kissling	Literature Analyst - ARAC Library
337-8361	Gilbert Churchill	Administrative Assistant
337-7833	Paul Daverio	Research Assistant
337-7833	Lloyd Dussell	Research Assistant
337-7833	Lowell Hoffman	Research Assistant
337-7833	David Hooper	Research Assistant
337-7833	Michael Pierce	Research Assistant
337-7833	Richard Wand	Research Assistant
	ADVISORY COMMITTEES	
337-4251	Lynne L. Merritt	Chairman, Science Advisory Committee
337-1493	John F. Mee	Chairman, Long Range Managerial Planning Committee
337-4241	Robert C. Turner	Director, Economic Projections Task Force

GENERAL INFORMATION - Area Code 812 - 337-7833

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ASSOCIATED BUSINESS FIRMS

Allison Division
General Motors Corporation
Indianapolis, Indiana

Arvin Industries, Inc.
Columbus, Indiana

Ball Brothers Company, Inc.
Muncie, Indiana

Cummins Engine Company, Inc.
Columbus, Indiana

Eli Lilly & Co.
Indianapolis, Indiana

Esterline-Angus Instrument Co.
Indianapolis, Indiana

The Glidden Company
Cleveland, Ohio

Hoffman Specialty Manufacturing Corp.
Indianapolis, Indiana

Indiana Bell Telephone Company
Indianapolis, Indiana

Inland Container Corporation
Indianapolis, Indiana

International Telephone and
Telegraph Corporation
Fort Wayne, Indiana

Kimberly-Clark Corporation
Neenah, Wisconsin

P. R. Mallory Company, Inc.
Indianapolis, Indiana

Mead Johnson & Company
Evansville, Indiana

Mid-Continent Carton Corporation
Louisville, Kentucky

New Castle Products, Inc.
New Castle, Indiana

Perfect Circle Corporation
Hagerstown, Indiana

Potter & Brumfield Division
American Machine & Foundry Co.
Princeton, Indiana

Public Service Company of Indiana, Inc.
Plainfield, Indiana

Pullman Incorporated
Hammond, Indiana

Quaker Oats Company
Chicago, Illinois

Radio Corporation of America
Camden, New Jersey

Ryan Industries
Evansville, Indiana

Howard W. Sams & Company, Inc.
Indianapolis, Indiana

Sarkes Tarzian, Inc.
Bloomington, Indiana

Socony Mobil Oil Company
New York, New York

Texas Gas Transmission Corporation
Owensboro, Kentucky

Union Carbide Corporation
Stellite Division
Kokomo, Indiana
Union Carbide Chemicals Company
Whiting, Indiana

Westinghouse Electric Corporation
Bloomington, Indiana

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SECTION 2 - LIBRARY: RETROSPECTIVE SEARCH SERVICE

MATERIALS

The collection of basic research materials in the ARAC Library is limited to the following UNCLASSIFIED series of reports deposited by the NASA Office of Scientific and Technical Information (OSTI):

PRIMARY SOURCES

1. Contractor Reports. These are final reports which have been prepared by industrial contractors' research personnel in compliance with NASA contract terms.

2. Technical Reports. These are final reports which have been prepared by NASA research personnel at various NASA installations such as the George C. Marshall Space Flight Center, Huntsville, Alabama.

3. Technical Notes. These are interim reports which have been prepared by NASA research personnel at various NASA installations.

4. Technical Memoranda. These are miscellaneous reports which had an initial restricted distribution.

5. Technical Reprints. These are both primary and secondary reports of research which has been performed by or for NASA. These reports have been published in various ways, and reprint rights have been retained by NASA.

SECONDARY SOURCES

1. Application Notes. These are compilations which explain in detail the application of new techniques and processes, e.g., Selected Welding Techniques, NASA SP-501.

2. Conference Proceedings. These reports integrate information on a major space-oriented topic. They have been presented at conferences sponsored by NASA alone, or jointly with other organizations, both government and private.

3. Reliability Abstracts and Technical Reviews. These are reliability evaluations of techniques, processes, and products which have been prepared for NASA. Original research reports are not available from NASA.

4. State-of-the-Art Reports. These are reports which summarize the basic theory or current developments in limited subject areas. They have

been prepared by private and governmental research personnel and may be found in all primary source series.

5. Technical Translations. These are reports of foreign research, primarily USSR, which have been published in general foreign language publications. NASA has acquired translated copies of these reports, or had them translated by commercial translating services.

6. Miscellaneous. These materials consist of reviews, handbooks, dictionaries, etc., which have been published by NASA for use by their personnel.

In addition, the ARAC Library will purchase various materials required by its staff to use NASA materials effectively.

INDEXES

The current indexes to NASA and general aerospace information are "Scientific and Technical Aerospace Reports" (STAR) and "International Aerospace Abstracts" (IAA). ARAC will place member company subscriptions for each of these publications upon receipt of a request designating specific addressees. These publications will be forwarded directly from the publishers to the member company addressee.

ORDERING RETENTION COPIES

A retention copy of any document available from NASA will be secured for member companies on request. The minimum information required is the accession number and/or report number listed in STAR; however, the complete citation is desired.

Documents cited to a member company in an ARAC bibliography which were originally published in general, trade, and society publications will not be available. Such documents listed in IAA may be identified by the accession number of the citation which will be prefixed with the letter "A" (e.g., A63-11111).

Normally, ARAC will forward requests by member companies for retention copies to NASA. Delivery may be anticipated in 2-4 weeks. For convenience, use ARAC FORM 452 for ordering retention copies.

To fulfill an urgent request, the ARAC Library will reproduce documents within the limits of available time and equipment. A copying charge of 5¢ per page (from full size documents) and 10¢ per page (from microfilmed documents) will be made for this service. Billing will accompany the last document reproduced on each request. Delivery may be anticipated in 5-7 days.

INTERLIBRARY LOANS

Upon request from a member company library, any document from the NASA report series in the ARAC Library may be borrowed for a period of one week, in addition to travel time.

RETROSPECTIVE SEARCH SERVICE

USE OF MATERIALS

The ARAC Library collection is a reference collection available to member company personnel during normal working hours. Use of these materials by others is limited to prevent interference with the Library's primary mission.

PREPARING RETROSPECTIVE SEARCH REQUESTS

A retrospective search is one in which the entire NASA library store of reference materials (as opposed to incoming materials only--see Section 3 - Selective Dissemination Service) is searched to find document titles that are relevant to the company's request. To request such a search, member companies are urged to prepare a REQUEST FOR RETROSPECTIVE LIBRARY SEARCH, ARAC FORM 451, a completed example of which is appended. Copies of this form are available from the ARAC Library, or they may be reproduced locally.

In order to increase the probability of retrieving relevant citations, state the question as precisely as possible. To assure the necessary precision, include the basic field of knowledge, the major characteristics and limitations applicable, and a supplementary list of descriptive terms and synonyms. The latter will be most useful if the question contains specialized technical terms.

Include such additional information as: the date the report is desired, a brief statement of the situation which generated the request, the types of information not desired, a list of previous sources and literature consulted, any limiting dates, etc. Also, indicate if this request is for an exploratory study, a state-of-the-art evaluation, or to answer a specific question. This will influence the number of references wanted (see example of ARAC FORM 451 appended). All the above information is desirable to formulate the proper search strategy. Normally, ARAC personnel will verify their understanding of the question with the requestor prior to starting a search.

SUBMITTING SEARCH REQUESTS

Requests for a library search should be mailed; however, they may be telephoned. In the latter case, the caller should be prepared to give the Library all the information necessary to complete the ARAC FORM 451. Telephoned requests for library searches will be given priority. Calls should be made directly to the ARAC Library, Area Code 812, 337-5656.

PREPARATION OF SEARCH REPORT

The report which is prepared by the Library as the result of a literature search will be a list of citations (bibliography) taken from the abstract indexes, STAR and IAA. This report will be evaluated by ARAC staff members for relevancy and forwarded to the person who requested it, according to the distribution instructions given by the company. Transmission of this report will terminate the Library's action on the search request.

USE OF SEARCH REPORT

Detailed Instructions on the use of a search report are provided with the letter covering each mailed report (see ARAC FORM 452 appended). Also, the reverse side of ARAC FORM 452 provides a handy means of ordering copies of documents cited in the report.

Evaluation of Reports by the requestor is highly desirable so that ARAC may improve its search service. The form letter covering each mailing includes a section to aid in this preliminary evaluation made by reviewing the abstracts in STAR and IAA of titles cited in the report (see ARAC FORM 451 appended). The reverse side of this form is the REQUEST FOR RETROSPECTIVE LIBRARY SEARCH mentioned above.

SUPPLEMENTARY SERVICES

CONFERENCES

To help define the question or to evaluate cited reports, the member company may request a conference. This conference will bring together the company's representative, ARAC literature analysts and engineers, and, if desired, appropriate members of the faculty.

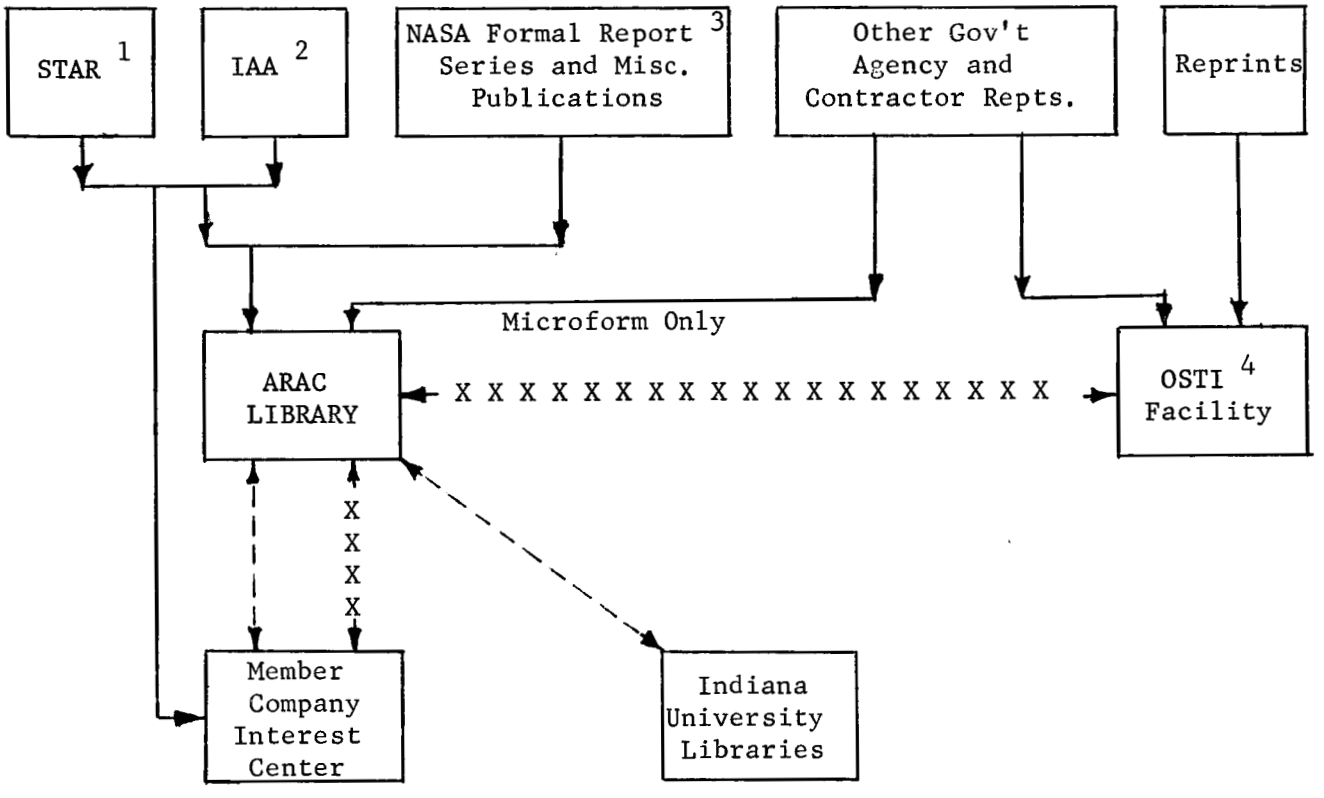
DATA PROCESSING

To provide library searches in depth, ARAC has access to the resources of NASA agencies and the Indiana University Research Computing Center. The latter operates an electronic information retrieval system of two types: (1) retrospective search of the library store of document accessions since July, 1960, and (2) selective searches of current accessions (biweekly) against technical interest profiles provided by member companies (see Selective Dissemination Service, Section 3).

ARAC Library operations are depicted diagrammatically on the following pages.

ARAC LIBRARY OPERATIONS

Materials Acquisitions



Interlibrary loans- - - - - - - - - - - - - - - -
Automatic distribution ————————————
Retention copies X X X X X X X X X X X X

1. Index to government reports prepared by Documentation Inc.

2. Index to scientific literature prepared by American Institute of Aeronautics & Astronautics.

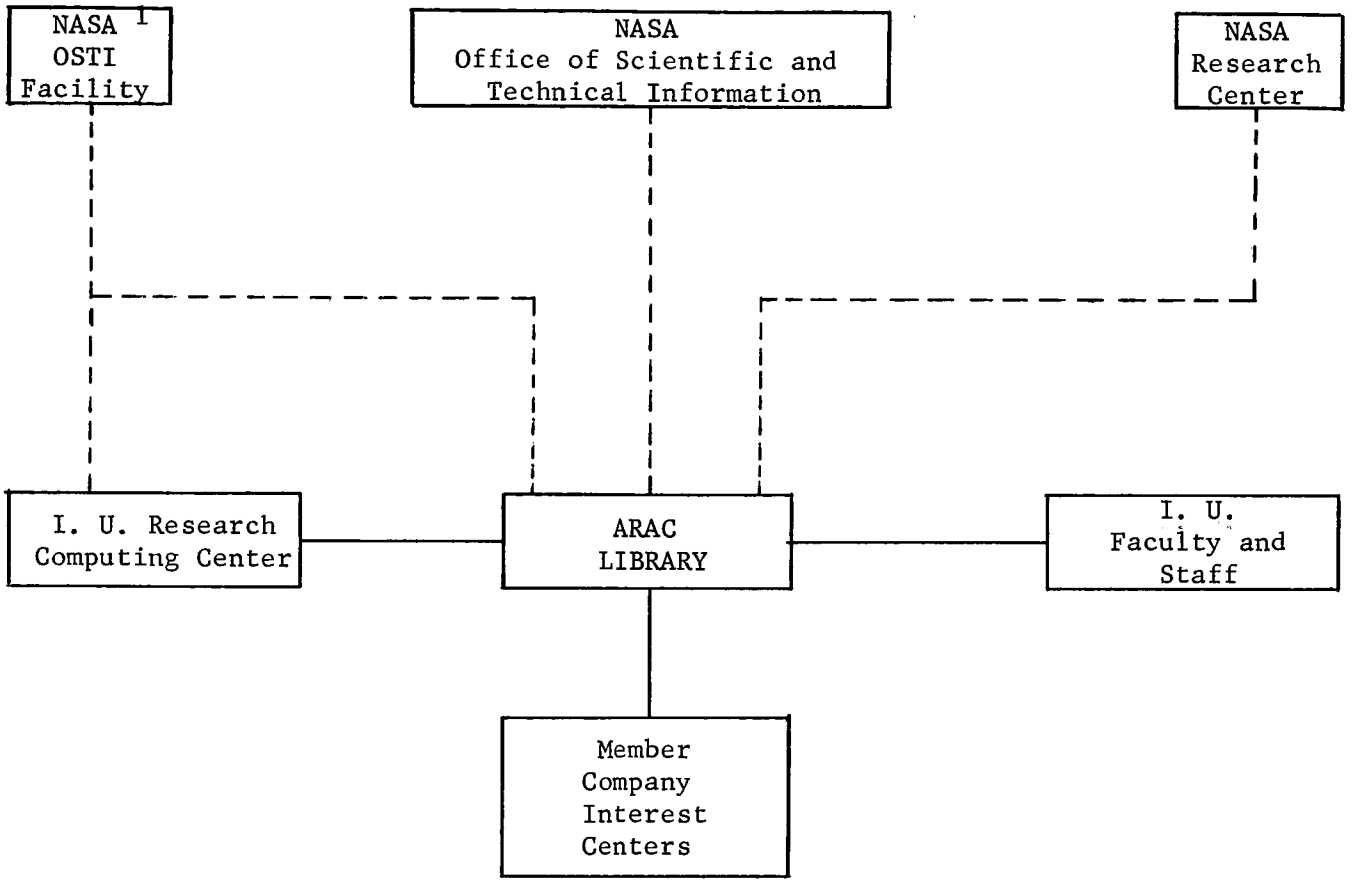
3. See operations manual for detailed description.

4. Storage and reproduction agency.

ARAC Library will procure retention copies of all available NASA materials upon request.

ARAC LIBRARY OPERATIONS

Reference Service



Support as required- - - - - - - - - - -

1. Electronic data processing agency.

REQUEST FOR RETROSPECTIVE LIBRARY SEARCH

COMPANY NAME: Abracadabra Magic Co.

COMPANY ADDRESS: Purg, Indiana

Individual to Contact for Further Information:
NAME: P. O. Darkness LOCATION: Lower Level PHONE: HE 1-1000
EXT: 0

FIELD OF QUESTION: Black Magic

QUESTION: to find an improved method of producing high heat and pressure; also new and improved torture methods

NUMBER OF REFERENCES WANTED: 1-5 [X] 5-25 [ ] 25-100 [ ] All [ ]
(No. depends upon type of search. See page 2-III, paragraph 4.)

CHARACTERISTICS	DESIRED LIMITATIONS	ACCEPTABLE LIMITATIONS
Temperature	6000° C	1000° - 10,000° C
Pressure	200 psi	100-200 psi
Time-life span	∞	1000 years to ∞
Techniques involved	Burning, roasting, torturing by fire, etc.	Anything available on high T. torture
Components involved	Spits, furnaces, grills	Anything applying to above
Materials	Brimstone, appropriate fuel to produce T	

LIST DESCRIPTIVE TERMS AND SYNONYMS WHICH INDICATE POSSIBLE SUBJECT HEADINGS AND/OR SEARCH AREAS:

High temperature
High pressure
Fire-flame
Heat-thermal
Brimstone-sulphur
Fuel-high energy fuel
Torture-iron maiden, rack, Chinese torture, boiling in oil-pain production

ADDITIONAL INFORMATION (USE ANOTHER SHEET IF NECESSARY):

We have a current problem concerning up-dating of certain of our operations. We are specifically interested in obtaining the above-listed characteristics in an environment in which oxygen will be scarce. We would be willing to provide extra oxygen if necessary, but would like to keep this at a minimum. Working conditions in attaining characteristics are not of importance.

NOTE: USE OUR TELEPHONE SEARCH SERVICE FOR PRIORITY REQUESTS. USE THIS FORM AS A GUIDE BEFORE PHONING TO PRECLUDE ORAL MISUNDERSTANDING AND TO SAVE TIME.

ARAC FORM 451
(10-63)

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Enclosed is an ARAC Library citation report indicating titles resulting from:

See instruction sheet enclosed on use of citation report (bibliography) and ordering retention copies. Please complete the evaluation form below and return in enclosed pre-addressed envelope.

EVALUATION - ARAC LIBRARY SEARCH

1. How many of the abstracts (in STAR and IAA) of citations in this report appear relevant to your needs? ☐ All ☐ 3/4 ☐ 1/2 ☐ 1/4 ☐ None

2. These citations appear to be useful because they provide:
   a. general information on the subject. _____
   b. partial or full (strike one out) solution to the problem. _____
   c. information not requested, but of interest. _____
   d. _____.

3. The remaining citations were not useful because they:
   a. were too general. _____
   b. lacked sufficient facts, data, etc. _____
   c. were not applicable to problem. _____
   d. _____.

4. Add any comments you may care to make concerning this service.

NOTE: IF EVALUATION OF THIS REPORT BRINGS TO MIND A NEED FOR A RETROSPECTIVE LIBRARY SEARCH (searching the entire library store), USE FORM ON REVERSE SIDE FOR PLACING REQUEST.

ARAC FORM 451 - 2 sides
(10-63)

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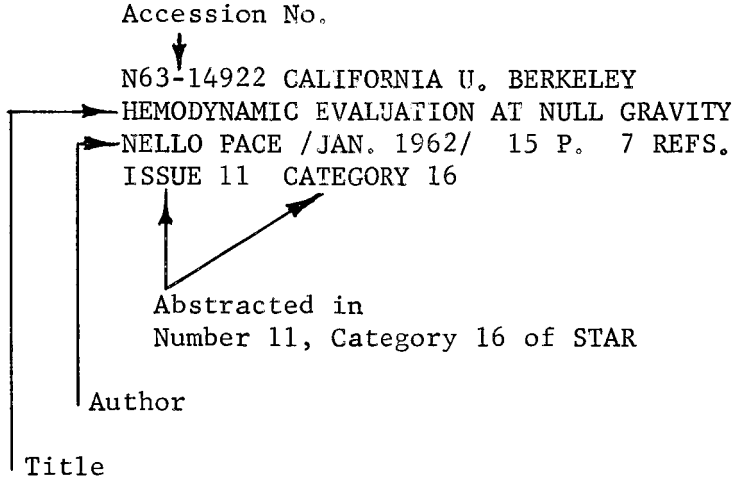
USE OF ARAC BIBLIOGRAPHY

Each bibliography citation report contains an individual reference (accession) number at the beginning of the citation. This reference number enables you to locate an abstract of the article as follows.

Those articles with accession numbers beginning with the letter "N" are abstracted in the Scientific and Technical Aerospace Reports publication, referred to as "STAR". Those beginning with the letter "A" are abstracted in the International Aerospace Abstracts publication (referred to as "IAA").

In addition to the accession number, a four-digit number is included. This number indicates the appropriate issue of either STAR or IAA in which the desired abstract is located. This number also identifies the interest category within the specific issue:

EXAMPLE:



TO ORDER DOCUMENT REPRINTS:

Entire documents may be obtained as follows:

1. STAR Documents - Reports abstracted in STAR are available from ARAC on a no-charge basis, even if a cost is indicated in the citation. There is a 2-4 week delay in obtaining copies from NASA. If faster service if required, ARAC will supply photocopies from their microfilm file at ten cents per page. (Use order form on reverse side.)

2. IAA Documents - All articles and reports indexed in IAA are in "open literature." They are published in readily available sources as indicated in the abstracts. These articles will not be available through ARAC. They will have to be obtained through regular channels.

(SEE DOCUMENT ORDER FORM ON REVERSE SIDE)

AEROSPACE RESEARCH APPLICATIONS CENTER

Indiana University Foundation
Bloomington, Indiana

NASA DOCUMENT ORDER FORM

REQUESTOR:	RETURN TO: Associate Director for Operations Aerospace Research Applications Center Indiana University Foundation Bloomington, Indiana

DOCUMENT IDENTIFICATION		TYPE OF COPY DESIRED	
ACCESSION NUMBER	AUTHOR (IF GIVEN)	NASA PRINTING (2-4 WKS DEL)	PHOTOCOPY ($.10/PAGE)

(SEE ORDERING INSTRUCTIONS ON REVERSE SIDE)

ARAC FORM 452 - 2 sides

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Bloomington, Indiana

SECTION 3 - LIBRARY: SELECTIVE DISSEMINATION SERVICE

SELECTIVE DISSEMINATION SERVICE (SDS)

To supplement the operation of the manual-machine retrospective retrieval system explained in Section 2, ARAC provides a Selective Dissemination Service for automatically notifying member companies of ARAC Library receipts pertinent to their interests. The importance and usefulness of this service should be self-evident because of the high rate of growth of ARAC's document store (approximately 1,000 additions per month). Without this service, maintenance of a current bibliography for a certain company project might require repeated resubmission of important "state of the art" retrospective search requests.

The Selective Dissemination System automatically provides each member company interest center with a biweekly notification of all new library titles pertinent to that center's scientific and technical interests. The selection of these documents from the set of new incoming documents is based on that center's interest profile (statement of technical interests). This notification is based on the set of new documents abstracted in each biweekly issue of STAR and IAA. To facilitate quick and efficient perusal by the member company, only the citations will be listed (accession number, title, author, contract number, and source). Occasional ambiguity in title wording can be cleared up by consulting the corresponding abstract in STAR.

USE OF SDS

There are essentially three steps in the use of this selective dissemination service: (1) the definition of member company interest centers, (2) the development of an interest profile to effectively characterize or represent each center's principle areas of technical concern, and (3) the evaluation of this profile in terms of the documents selected.

1. Interest Centers. It is well recognized that appropriately defined interest centers will not be identical in organizational form and definition for all companies. In some firms these centers will coincide with existing departments or divisions. In others, they may be separate laboratories concerned with basically different areas of research or development. In still other firms, they may be geographical plant locations or individuals. A guiding definition for these interest centers is that each one be basically concerned with a relatively homogenous area of scientific and technical information. An interest center can be an existing organizational unit within the firm. However, the unit must have a small enough area of interest to make possible a rather specific definition of these interests.

AEROSPACE RESEARCH APPLICATIONS CENTER

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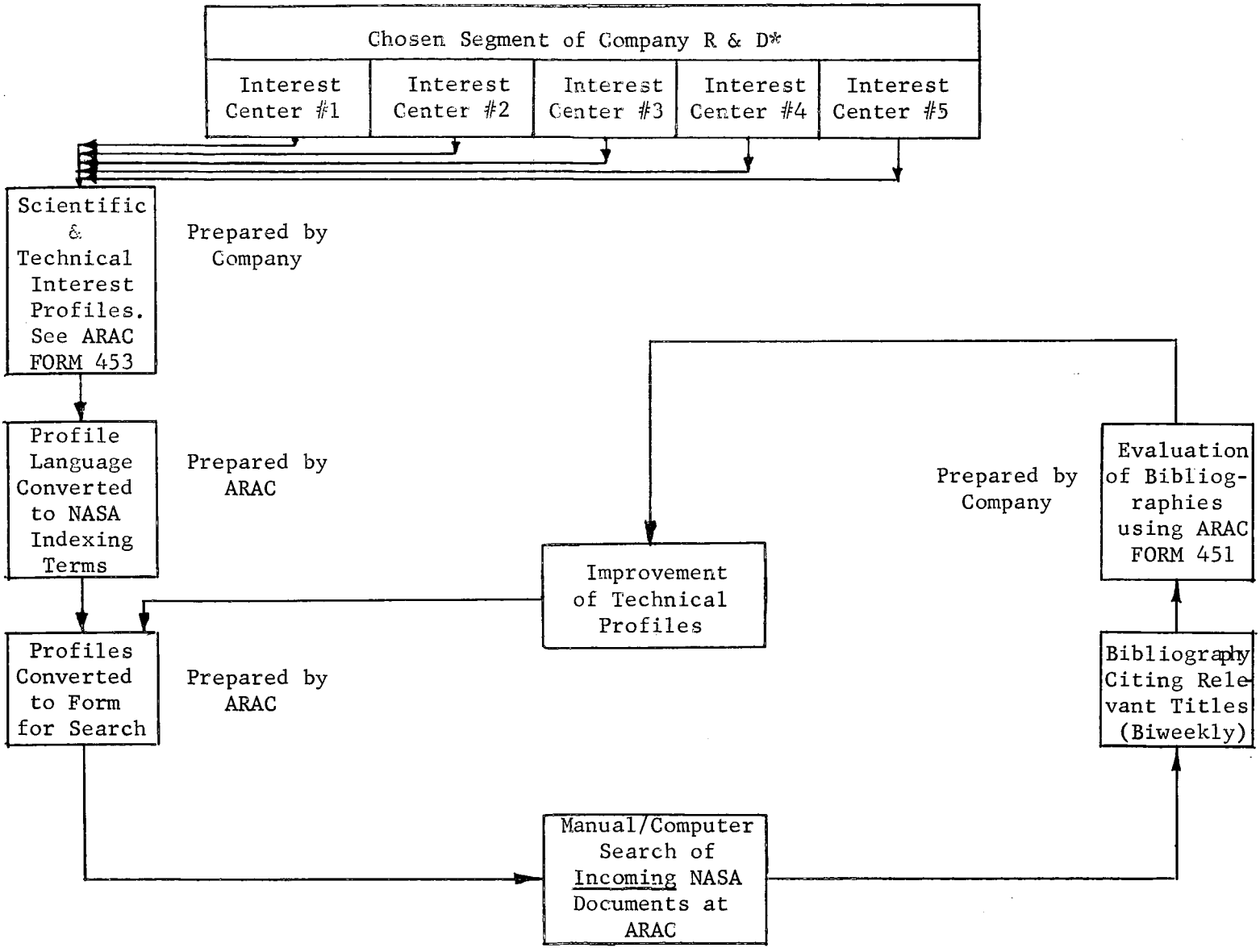
SELECTIVE DISSEMINATION SERVICE



*Depending upon the scope of the total R & D effort of the company, one or more segments of its R & D effort may be divided into Interest Centers, defined as a man or group of men having relatively homogenous scientific and technical interests, e.g., a ferrous metallurgy group.

2. Methods of Profiling. ARAC's experience has led to the development of a standardized method of preparing a profile, using ARAC FORM 453, a completed example of which is appended. The example provided is self-explanatory. Copies of this form may be obtained through ARAC or reproduced locally.

3. Profile Evaluation. Each interest profile should be evaluated as early as possible after getting it "on the line." Evaluation is performed by both the interest center coordinator and the ARAC technical people responsible for servicing the profile, working together. The process normally requires one or two phone calls and a visit by ARAC to the interest center.

Upon receipt of the first SDS mailing, which takes the form of a report of citations (bibliography), the same as in the case of a retrospective search, the interest center coordinator should evaluate the report by studying the cited titles, reviewing the abstracts of these titles in STAR and IAA, and filling out ARAC FORM 451, the same as for a retrospective search (see Section 2 for an example).

Upon receipt of the evaluation report (ARAC FORM 451) on the first mailing, typically the ARAC engineer responsible for the interest center will phone the center to further clarify and refine the profile.

The second and third mailings of biweekly runs against the improved profile should also be evaluated by the interest center coordinator with ARAC FORM 451 being returned to ARAC.

At this point in the evaluation process, a visit by ARAC engineers to the interest center is sometimes necessary to work the final bugs out of the profile, after which the profile stays on the line, automatically notifying the interest center biweekly of receipt of library reports relevant to their interests. Revisions of profiles may be made at any time as primary technical interests change.

The following diagram depicts operation of the Selective Dissemination Service.

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SELECTIVE DISSEMINATION SERVICE
INTEREST CENTER FORM

NAME John Smith, Manager, R & D TELEPHONE ED 6-5301

ADDRESS XYZ Valve Company DATE August 13, 1963

3536 North Adams Street

Bloomington, Indiana

Describe the general aims of this center, the products involve, the production methods, and the current and planned research.

Our group is responsible for product development of new and improved diaphragm valves, controllers, and regulators. We have a complete flow laboratory for testing under a broad range of operating conditions. We provide product engineering with complete design standards on new and improved products. Certain of our customers cooperate in testing and evaluation of new and improved product designs.

Our products are primarily used in the oil and gas industry, power industry, and by certain OEM accounts. We are a small supplier in the markets we serve. We consider ourselves a specialized quality supplier of fluid control devices.

Our firm purchases rough stock valve bodies and machines them to size. Fabrication is primarily machining, welding, and assembly.

We are interested in improving and expanding our line and the markets we serve. We are considering the development of a split-body valve for the chemical industry and a line of bar stock valves. We are interested in electrical/electronic fluid control devices as well as any electro-pneumatic combinations.

A condensed catalog is attached which outlines our products in some detail.

The following pages should be filled in with terms appropriate to your interest center. Synonyms should be included and each term should be amplified in the manner indicated. In addition, each term which describes a new or unusual product or concept should be defined, and if possible, a reference concerning it should be cited. Avoid broad terms such as "mathematics." If there are more terms applicable to the various aspects of your center than there is space provided, please use additional sheets incorporating the same format. If possible, please send a catalogue when you return the form.

MAIN DESCRIPTORS and RELATED TERMS	In the space below answer the following questions for each term. Any pertinent data not covered by the questions should also be included. To what use do you put this? What related subjects do you wish explored? What problems are associated with this?
VALVE SEALING seals O-rings stuffing box stem and seat seal gaskets, lubricants	Leakage in valves and other fluid controls is a common problem. We are interested in seal materials such as teflon, stainless clad asbestos, teflon asbestos rings, and graphitized asbestos rings. We are also interested in clamping devices and fluid control devices for elimination of gas and liquid leakage.
pressure sealing and leakage elastromeric seals metal-to-metal seals	The pressure range of applications runs from 15 psi to several thousand psi. High temperature and pressure operating ranges accentuate leakage problems. We are also interested in information as related to cryogenic conditions.
NOTE: IN THIS EXAMPLE, "VALVE SEALING" is ONLY ONE MAIN DESCRIPTOR. A TYPICAL INTEREST CENTER MIGHT HAVE 8 TO 10 MAIN DESCRIPTORS OR MORE, EACH MAGNIFIED SIMILAR TO VALVE SEALING.	

Continue in this manner using all applicable descriptors and terms.

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SECTION 4 - INDUSTRIAL APPLICATIONS (NASA FLASH SHEET) SERVICE

NASA INNOVATIONS

NASA Flash Sheets are reports of product and process innovations made by scientists and engineers employed at NASA Regional Centers, such as the George C. Marshall Space Flight Center at Huntsville, Alabama, or by scientists and engineers at NASA prime contractors. The law requires NASA prime contractors to divulge innovations occurring in the execution of contracts.

Innovations are defined as, "A means of accomplishing a work objective either more effectively than before, or for the first time. The term includes the development, invention, discovery, modification or new use of a device, process, material, system, or technique."

NASA PROCESSING OF FLASH SHEETS

Regional Centers. Flash Sheets are written up on a special form by a Technology Utilization Office at each of the regional centers of NASA. Each office employs a chief and senior engineers of various types. Thus, a total in excess of 50 NASA technical people are serving ARAC via Flash Sheets. Some of the innovations reported are covered by patents or patents pending, others not.

NASA Headquarters. The Flash Sheets are sent by the regional centers to the Technology Utilization Office of NASA in Washington where they are cleared for classified (secret) material and the patent situation checked out. Only non-classified Flash Sheets are available to ARAC and its member companies.

ARAC PROCESSING OF FLASH SHEETS

Abstracts. As ARAC receives NASA Flash Sheets, they are abstracted by ARAC staff engineers with the assistance of University science faculty members. Based on the present flow of Flash Sheets from NASA Headquarters to ARAC, all abstracts will be sent to all member companies' interest centers. Until further notice, no attempt will be made to selectively disseminate abstracts. Dissemination of abstracts will be to member firms in accordance with the mailing procedure prescribed by each member company. A sample Flash Sheet Abstract, ARAC FORM 100, is appended. Note that the lower detachable portion is designed for convenience in requesting full Flash Sheet information.

Full Flash Sheet Information. ARAC will send full information on a particular Flash Sheet to the member firm upon request. Requests for full Flash Sheet information should be based on serious interest on the part of

the requesting company. Reproduction load precludes filling requests based solely upon technical curiosity; interest in applying the innovation is a prerequisite.

Library Search--Flash Sheets. ARAC will run in the ARAC Library an author search and, where appropriate, a subject search on Flash Sheets on which full information is requested. Copies of relevant documents disclosed by these searches will be sent as part of the full Flash Sheet information.

Source Information. A company interest center, after review of full information on a particular Flash Sheet, should proceed as follows if further information is needed to decide upon initiation of a development project or action aimed at product or process improvement utilizing the Flash Sheet innovation: The interest center should request the company coordinator of ARAC operations to arrange for ARAC to obtain additional information from the Flash Sheet source. The company coordinator will send to ARAC the "REQUEST FOR SUPPLEMENTARY FLASH SHEET INFORMATION," ARAC FORM 101, copy appended. Accompanying the form should be a list of specific technical questions which will identify the type of information and answers required beyond those provided in the Flash Sheet. This list is required to guide NASA in its search for relevant supplementary information at the Flash Sheet source.

SPECIAL FLASH SHEET SERVICES

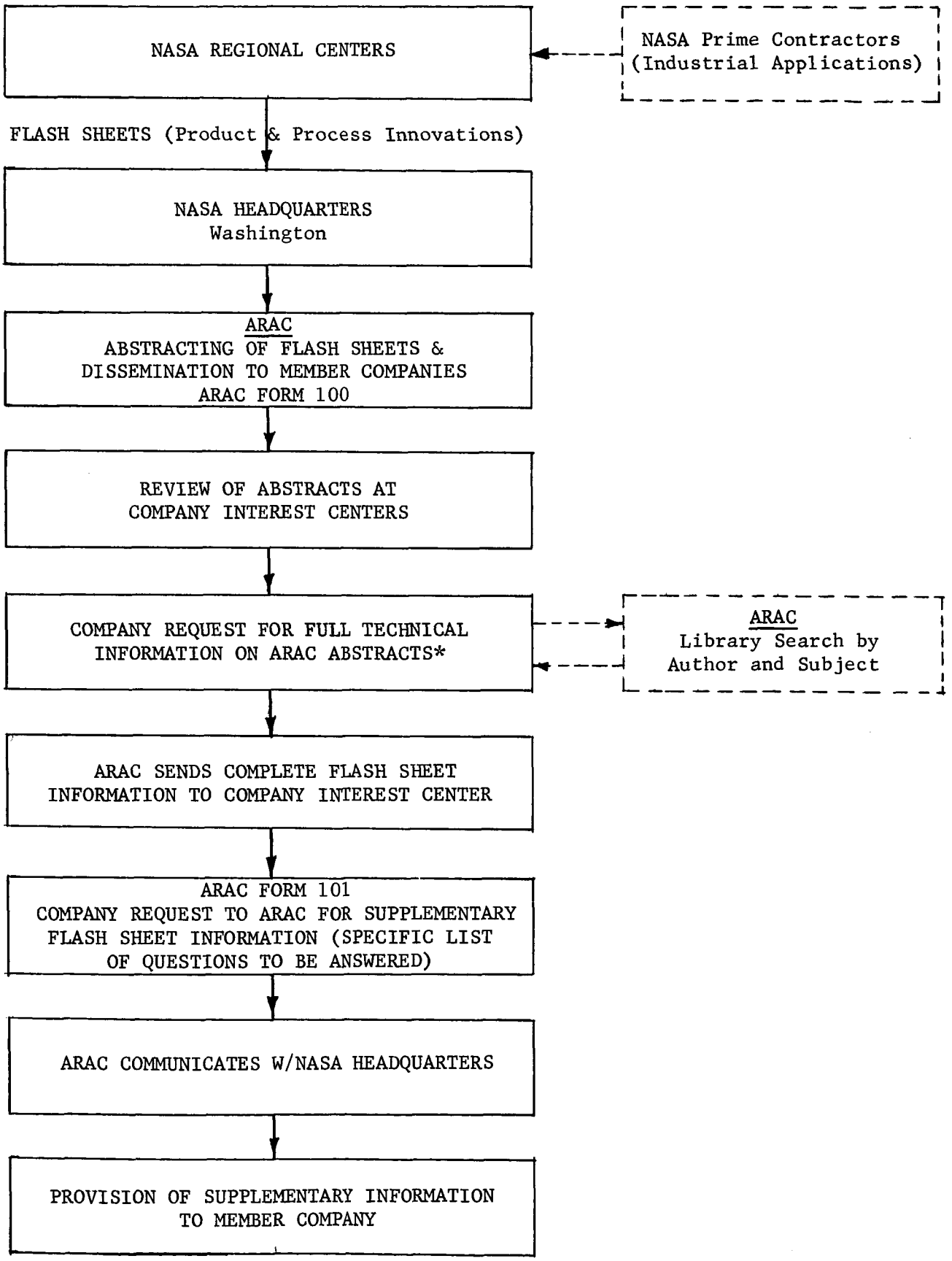
Flash Sheet Panel Discussions. From time to time, collections of Flash Sheets on particular subjects of general interest to a number of member companies may warrant the use of a panel discussion at ARAC. These panel discussions may center on the needs of a single company or may involve participants from several interested member companies. Selected ARAC staff members and faculty members from Indiana and other universities, and other recognized authorities on the subject may be involved in the various discussions. These panel discussions may be initiated at the request of a single company, several companies, or ARAC.

SUMMARY

The above procedures involving NASA Flash Sheets are summarized in the following diagram. Correspondence on this ARAC service should be directed to the Associate Director for Operations, Aerospace Research Applications Center, Indiana University Foundation, Bloomington, Indiana.

AEROSPACE RESEARCH APPLICATIONS CENTER

INDUSTRIAL APPLICATIONS SERVICE
DISSEMINATION OF FLASH SHEET INFORMATION



*Intention to apply the innovation is a prerequisite for processing requests beyond this point.

AEROSPACE RESEARCH APPLICATIONS CENTER
INDIANA UNIVERSITY FOUNDATION
BLOOMINGTON, INDIANA

FLASH SHEET NO.
ARC-7

ABSTRACT NO.
FSA-63-0119

DATE
9/20/63

TITLE: METHOD OF MAKING THIN-WALL METAL CASTINGS

A method of centrifugally casting thin-wall metal objects has been developed which is less time-consuming and less expensive than existing methods. Essentially the process consists of thermoforming a sheet of plastic over a mandrel of the required shape; investing the resulting plastic shape with a ceramic slurry; oven-firing the plastic and slurry (consuming the plastic in the process); and, using this ceramic mold with cavity the shape of the plastic, centrifugally casting thin metal shapes.

The process should have a wide range of application including the making of models and components used in research, medical research when non-corrosive metals are necessary, electronic components, parts made of precious metals, proto-type models, etc.

TO: Associate Director for Operations
Aerospace Research Applications Center
Indiana University Foundation
Bloomington, Indiana

DATE_____

We are seriously interested in Flash Sheet No._____,
Abstract No._____. Please send a copy (original in full or, if not available in this form, provide a full analysis by ARAC of the Flash Sheet).

(Please note: Reproduction load precludes filling requests based solely upon curiosity; intention to apply the innovation is a prerequisite.)

SIGNED_____ ADDRESS_____

TITLE_____ _____

FIRM_____ _____

ARAC FORM 100
(10-63)

AEROSPACE RESEARCH APPLICATIONS CENTER

Indiana University Foundation
Bloomington, Indiana

REQUEST FOR SUPPLEMENTARY FLASH SHEET INFORMATION

CONFIDENTIAL

DATE _____

TO: Associate Director for Operations
Aerospace Research Applications Center
Indiana University Foundation
Bloomington, Indiana

Dear Sir:

Please make appropriate arrangements to obtain for us additional information beyond that contained in Flash Sheet No. _____, Subject _____.

The additional information in which we are interested is indicated by the questions shown on the attached sheet. Our interest in this Flash Sheet can be served best by our acquiring this additional information by (date) _____ at the latest.

We certify that our interest in having this additional information is relevant to the final stage of determining whether or not we should proceed with a development project involving innovation(s) contained in the above-mentioned Flash Sheet.

SIGNED _____

TITLE _____

FIRM _____

ADDRESS _____

_____

NOTE: THIS REQUEST MUST BE ACCOMPANIED BY A LIST OF SPECIFIC TECHNICAL QUESTIONS THAT REFLECT YOUR NEEDS FOR SUPPLEMENTARY INFORMATION.

AEROSPACE RESEARCH APPLICATIONS CENTER

Indiana University Foundation
Bloomington, Indiana

SECTION 5 - ENGINEERING INFORMATION SERVICE ON CURRENT PROBLEMS

Member companies will have current engineering problems that ARAC may help solve through its knowledge of current unreported technical developments at the various regional centers of NASA. Most of these problems will be concerned with current products, processes, and materials. To help solve these problems, ARAC provides a rapid-response search service. This service is characterized by speed of operation.

Staff engineers of ARAC spend time at NASA regional centers for the purpose of getting acquainted with current research projects. Likewise, ARAC staff engineers will, upon invitation, visit member companies to learn current technical problems. Out of such visits may come a matching of current unpublished NASA research findings to current company technical problems.

As an example of this service, ARAC staff engineers learned in a visit to one NASA regional center that its engineers were in the late stage of research in leak detection techniques. Obviously this subject is of great importance in design, building, testing, and operation of space vehicles. A member company had similar problems in connection with production, testing, and operation of products involving a vacuum or inert gas atmosphere. Solutions to some of the company problems were found in the current NASA research activities on leak detection.

When a "match" of current NASA research or engineering findings and member company current problems is achieved, ARAC staff engineers will aid the member company in formulating specific technical questions about their problems, then transmit the questions to the appropriate person in NASA. Questions of a broad nature, or general questions, cannot be handled in this service. The reason for this is obvious. For instance, if a question on leak detection were framed as, "We want to know all about leak detection," ARAC could only reply that the inquiry can be answered when a NASA State of the Art Report on this subject is published.

Member companies may transmit current technical problems by phone or in writing to the ARAC Director of Operations. In such cases, the problem should be made specific, with enough background and related information provided to insure proper interpretation by ARAC personnel.

It is obvious that practical procedures for disseminating NASA information to companies on a national basis cannot include many services in which direct contact with individual NASA scientists and engineers is involved, as this would interfere seriously with NASA's main objectives in the exploration of space. Accordingly, this service on current engineering problems, which often does involve direct contact with NASA scientists and engineers, should be utilized by member companies with discretion.

For instance, this service should not be used to displace other means by which companies normally solve their current engineering problems. Rather, it should be used only when these other means are exhausted. In particular, it should not be used in lieu of normal company functions. For instance, this service cannot be used in lieu of normal company purchasing activity to track down suppliers of materials, unless such materials are uniquely related to a product or process development project initiated by NASA and not generally available.

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SECTION 6 - SCIENCE PROGRAMS

University scientists participate in ARAC operations in two classes of activity: continuing services to member companies, and special services to member companies.

CONTINUING SERVICES TO MEMBER COMPANIES

1. Consultation Service to ARAC Full-Time Staff. University scientists provide consultation to ARAC full-time staff personnel in their provision of services to member companies as described in other sections of this manual.

2. Panel Discussions. The ARAC staff has identified certain major interest areas of member companies. When appropriate, a panel discussion of specific major problems in these areas will be initiated with representatives of member companies and University scientists. This has been done for the member companies in the petroleum industry.

3. Weekly Bulletin of University Scientific Events. Representatives of member companies are strongly urged to attend the events of appropriate topics which are listed on a weekly bulletin of seminars, conferences, discussions, and lectures sent to member companies.

While the information discussed in these programs may be of great value to representatives of member companies, another benefit which may be of equal value will be the informal discussion after the program and the opportunity to meet and discourse with University scientists.

Names and addresses of company representatives who desire these notices on a continuing basis should be sent to the ARAC Associate Director for Science.

4. Significant University Scientific Publications. Publications describing University scientific programs and facilities are mailed to member companies from time to time. These publications describe major research interests and facilities of the University, and some list the faculty involved and their backgrounds. Suggestions for additional literature which should be developed will be most welcome.

5. Research Reports. The I. U. Foundation issues regular reports of research grants and projects under way and those which have just been granted to the University. These are remarkably specific indications of University research interests, faculty involved, and the trends of research in certain broad scientific areas. The reports constitute a valuable source of ideas for industrial work as well as names of outstanding scientists who are interested in specific projects. These are sent regularly without request to each member company.

SPECIAL SERVICES TO MEMBER COMPANIES

In most cases the special services provided to ARAC member companies by University scientists require special financial arrangements (as opposed to the continuing services described above, which do not).

These special services are an excellent source of fresh new ideas for the research and development activity of a company. University scientists, with their up-to-date information and broad experience, may very well supply a spark which the company's personnel may find valuable in their work.

The various special services are described below. Arrangements for these services must in all cases be made through the ARAC Associate Director for Science before contact is made with individual faculty scientists.

1. Consultation Service. The University science faculties include internationally known authorities in various fields which are described in the publications noted above. Many of these scientists may be engaged as consultants by member companies. Consultation service may be arranged for one or two days, or on a regular continuing basis.

Usually this consultation service involves a visit to the company site, but sometimes company representatives may wish to confer with a scientist on the campus. In any case, if an appreciable part of a day is involved or subject preparation by the scientist is necessary for the visit, then specific financial arrangements with the scientist should be made through the Associate Director for Science.

Consultation has often been found the most profitable relationship which a company may have with a University scientist. The scientists' different backgrounds and approach to problems are often quite stimulating to an industrial Research and Development staff, for fresh insights often are generated.

2. Panel Discussions. When a group is convened to discuss a specific research topic, the discussion which results often sparks new ideas and reveals new information on old problems which is useful to all discussants. Bringing together University scientists and company personnel who are knowledgeable about a specific topic may be done within a member company. This is really a type of consultation. The member company may prefer the panel to be convened here on the campus.

3. Joint Research Proposals. One of the features of many NASA research projects is the fact that they are joint ventures of a company and a university. One complements the other in resources and facilities. The Associate Director for Science will assist in the preparation of such proposals.

4. Fellowships. There are many advantages to both the University and a company in the awarding of fellowships. To the company, this may be the opportunity to identify outstanding graduate students who may be potential employees. Also, the research performed by the recipient may be valuable for the company. This is an important means of assisting education, and in so doing, a potential immediate benefit for the granting company.

5. Research Grants by a Company to the University. Company interests often dictate further research in an area for which it lacks facilities or staff with appropriate background, or for which the length of time involved is too great for normal company operations. These are often the type of research projects in which a University scientist may be interested. Contact the Associate Director for Science for details of faculty interest areas.

6. Endowed Professorships. While at first glance this appears to be of sole benefit to the University, there are real opportunities for a company in setting up this sort of arrangement. If the characteristics of the recipient are appropriately drawn, the holder of this title may be performing research work of direct and indirect benefit to the company. Also, he will probably be available for part-time work in the company. His role in the education of graduate students will, in effect, produce a team of researchers working on common problems.

Another variation of this idea is the employment by the University of a company employee who by his competence and background complements the University faculty as a colleague. He may be put on a part-time or full-time faculty basis in the University, but a substantial fraction of his salary is sustained by the company. One example is the employment of an electronics engineer, paid by a company, in a local medical school because his interests were in the medical field. Such people serve also to keep in close touch with bright researchers coming through the graduate program.

7. Short Courses for Company Personnel. There are many research areas which are so new that short courses for company personnel will prove valuable. An example is a short course on statistical methods for biological researchers. If these are substantial enough, University credit arrangements may be made.

8. Assistance in Research Proposal Preparation. The task of writing proposals to government agencies for research grants to a company is a time-consuming and delicate art. One of the comments made by a government representative is that, on the average, such proposals from midwestern companies are poorly drawn. The Associate Director for Science and other staff members who are experienced in this work are available for assistance.

9. Undergraduate Scholarships. Undergraduates in the science departments are encouraged early in their careers to become involved in research. Financial support is of great benefit in the encouragement of bright young researchers as scholarship money is in short supply. Recipients may be children of member company employees. These undergraduates are also potential summer employees of significant value to companies.

SCIENCE ADVISORY COMMITTEE

The Science Advisory Committee under the Chairmanship of Dean Lynne L. Merritt, provides a continuing source of support for the program of ARAC.

Because of his work as Associate Dean of Faculties, Dr. Merritt is intimately acquainted with the many research activities carried on by University faculty members; and because of his professional status as a chemist, he has an even closer knowledge of developments in this and related fields. The members of his committee supplement his fields of knowledge and interest.

The Science Advisory Committee assists ARAC in the development of policy, recommends lines of development for programs and assists in identifying and interesting faculty members and graduate students who may be helpful in connection with the programs of ARAC.

The Science Advisory Committee also aids in establishing panel discussions around topics of current interest in the research applications field. Details of these panel discussions are explained in Section 8, EXPERIMENTAL PROGRAMS.

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Bloomington, Indiana

SECTION 7 - MANAGEMENT PROGRAMS

ADVISORY COMMITTEE ON LONG RANGE MANAGERIAL PLANNING

Long Range Managerial Planning is proving to be one of the more difficult problem areas for top managers at the present time, if the experience of ARAC member companies is indicative of general conditions. To assist in the development of appropriate efforts by the Center in this field, an Advisory Committee on Long Range Managerial Planning has been established under the chairmanship of John F. Mee, Mead Johnson Professor of Management.

This committee assists in the development of long range economic projections on national and regional bases as well as industry by industry projections. The committee also stimulates the development of appropriate seminars and other instructional arrangements to aid top and middle managers in keeping apprised of the more recent developments in long range managerial planning.

The committee takes a special interest in the interrelationships between long range managerial planning and R & D Management and Technology Utilization. This aspect of the committee's work is vital to the operation of the Center since experience to date indicates that effective technology utilization depends on effective R & D management practice, and this in turn depends on the best possible efforts in the long range managerial planning field.

REPORTING NASA DEVELOPMENTS IN MANAGERIAL TECHNIQUES

Under the direction of the Associate Director for Development, faculty members of the Graduate School of Business review new managerial techniques and processes developed as a result of NASA's operations and where considered applicable report these to member companies.

QUARTERLY MEETINGS

Quarterly meetings of top management personnel of the member companies are held in part to review ARAC operating experiences, and in part to consider new managerial developments.

CURRENT MANAGEMENT PROBLEMS SERVICE

Member companies are invited to make requests in writing or by telephone to the Associate Director for Development for assistance on specific managerial problems. He will forward printed materials if they are directly available or where required, visit member company offices.

The following procedure is recommended:

1. Representatives of member companies should write or call the Associate Director for Development relative to requests for information on managerial and related problems.

2. The Associate Director for Development will provide information either by telephone, memorandum or by forwarding printed materials or where required, prepare special reports.

3. Upon request and with appropriate lead time, the Associate Director for Development and/or members of his staff, will visit member company offices to discuss their managerial and related problems.

MANAGEMENT PANELS, SEMINARS, AND WORKSHOPS

ARAC will arrange for panel discussions, seminars, and workshops on selected subjects of interest to management. Specialized personnel will be provided by ARAC for these activities. For instance, companies interested in PERT sent representatives to a workshop on this subject. Experts in the subject of a day's program are obtained from the faculty of the Graduate School of Business, other universities, and industry as required.

This service may be initiated at the request of one or more member companies or at the suggestion of ARAC. The topics of these panels and seminars may cut across the entire field of management interest--top management, functional management (marketing, finance, production, accounting, etc.), management training and development, personnel practices, etc.

When more extensive managerial consulting services are required, the Associate Director for Development will assist companies in identifying consultants who may meet their requirements, but individual consulting arrangements should then be worked out between company representatives and the consultants involved.

MANAGEMENT PUBLICATIONS

ARAC member companies will regularly receive without request publications of the Graduate School of Business such as Business Horizons, The Indiana Business Review, and pertinent publications, including research reports of the Bureau of Business Research, on managerial subjects.

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SECTION 8 - EXPERIMENTAL PROGRAMS

In keeping with the nature of the NASA contract with ARAC, experimental programs are undertaken to develop new and improved methods of disseminating NASA technology to member firms. Sections 1 through 7 of this manual explain established services. This section explains experimental programs that are about to be mounted. These programs break down into two classes, improvements in current services and new services as follows:

Improvements in Current Services

1. Telephone search service
2. Providing abstracts of documents
3. Library search on Flash Sheets

New Services

1. Broadening ARAC's technology sources
2. Long Range Managerial Planning Service
3. ARAC Industrial Applications Service

IMPROVEMENTS IN CURRENT SERVICES

Telephone Search Service. ARAC has inaugurated a rapid library search service for the convenience of member company personnel having an immediate need for state of the art or other literature references. This service is not to be confused with the ENGINEERING INFORMATION SERVICE ON CURRENT PROBLEMS, SECTION 5. The latter service is designed to provide member companies with readily available unpublished technical information. The telephone search service involves only published information. Telephoned search requests will be given priority treatment.

When telephoning a search request to ARAC, it is desirable that the requestor execute ARAC FORM 451, REQUEST FOR RETROSPECTIVE SEARCH, before phoning. ARAC will enter the information on a copy of this form at its end. This procedure will improve communication and preclude misunderstandings, with possible reruns of searches and consequent delays.

Providing Abstracts of Documents. Present arrangements require the recipient of an ARAC citation report (bibliography) resulting from a retrospective search (Section 2) or a selective dissemination search (Section 3) to refer to the indexes, STAR and IAA, to obtain abstracts of the titles cited in the ARAC report. This arrangement is effective only to the extent that copies of STAR and IAA are readily available to all interest centers working with ARAC. As operations expand to include

more interest centers, the task of getting biweekly copies of STAR and IAA out to these centers on time becomes increasingly complex and expensive.

Accordingly, ARAC will soon inauguarte the practice of mailing along with the citation report copies of the abstracts of titles cited in the report. This improvement in ARAC Library services will, in effect, complete the search service provided by ARAC.

Library Search on Flash Sheets. In the past calendar quarter, ARAC experimented with the practice of making a library search on NASA Flash Sheets by author and subject. Such a search was made on those Flash Sheets on which member companies requested full information. Results so far dictate that the experiment be continued, as significant NASA Technical Reports, Notes, and Memoranda have been disclosed in a number of these searches. This procedure is indicated as a permanent one in Flash Sheet operations as described in Section 4, but is subject to discontinuance if further experimentation discloses marginal benefits from the procedure. Comments from the recipients of these reports on the value of the library documents sent with full information on Flash Sheets will be useful in making this determination.

NEW SERVICES

Broadening ARAC's Scientific Technical Information Sources. In order to magnify the usefulness of the search services provided by ARAC, NASA technology will be augmented with other governmental and non-governmental sources as arrangements are worked out with the various agencies. Negotiations are currently under way with the Defense Documentation Center, U.S. Department of Defense, and the U.S. Atomic Energy Commission. If these two sources can be added, they will result in ARAC covering approximately 90 per cent of governmental source information.

Arrangements have been made whereby ARAC will extend its searches for member companies to include literature in the various specialized science libraries of Indiana University. Planning is under way on the addition of other non-governmental sources.

If and when appropriate arrangements are made to add these various sources, ARAC will notify member companies, providing appropriate procedures for utilizing these sources through ARAC.

ARAC Industrial Applications Reports. ARAC will experiment with two additional services under this name, one of which draws on NASA documents and the other on the background and knowledge of University scientists.

1. NASA Documents. In the regular course of search activities, ARAC engineers occasionally turn up technical reports that appear to have immediate and direct applicability to member company R & D activities. An example on a Portable Electronic Moisture Detector for Reinforced Plastics is appended. These reports will be sent to all member company interest centers on a non-selective basis.

2. Faculty Science Reports. Under the direction of the Science Advisory Committee (see Section 6) appointed by the President of the University, groups of faculty scientists will convene from time to time to discuss likely industrial applications of both old and new developments in their fields of knowledge. These discussions will be edited, augmented by relevant NASA documents resulting from a library search, and reported as ARAC Industrial Applications Reports, which will be disseminated to member companies on a non-selective basis.

Economic Projections Task Force. The President of the University has appointed a task force to develop economic projections and industry studies to facilitate the work of the Center. This task force will adapt currently available economic projections on national and regional bases for use in various Center programs and develop various projections of special interest to the Center. Efforts will be made to identify significant longer term trends of economic development, changing competitive patterns, shifts in consumer preferences and behavior, and market potential for various industry areas. The work of the task force is designed to form a sound basis for long range managerial planning by managers of member companies.

Long Range Managerial Planning Service. A special advisory committee on long range managerial planning has been appointed by the President of the University (see Section 7) to aid the Aerospace Research Applications Center in various of its operations with member companies. Effective technology utilization by member companies can be achieved principally as a logical effort within effective R & D programs, which in turn can be developed effectively through long range managerial planning.

Management Planning Seminars. In cooperation with the Indiana Executive Program, experimental seminars involving industry economic projections, potential market changes, potential shifts in competitive relationships and related activities will be held at various times as announced by ARAC staff. The seminars will be based largely on the work of the Economic Projections Task Force and the Advisory Committee on Long Range Managerial Planning. Member companies are invited to participate in these seminars as they are announced.

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Indiana University Foundation
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ARAC INDUSTRIAL APPLICATIONS REPORT

NASA-101

TITLE: A PORTABLE ELECTRONIC MOISTURE DETECTOR FOR REINFORCED PLASTICS*

A portable instrument is described which is capable of detecting moisture in small concentrations in fiberglas reinforced plastics. Resonant circuits in a balanced bridge network determine empirically the change in permittivity and dissipation factor of the material. A stable crystal-controlled oscillator powers the bridge and measurement consists of placing a probe against the material, readjusting the bridge and noting the imbalance.

*NASA Report N62-16729, Issue 17, Category 15

TO: Associate Director for Operations
Aerospace Research Applications Center
Indiana University Foundation
Bloomington, Indiana

Please send full information on NASA-101.

SIGNED_____ ADDRESS_____

TITLE_____ _____

FIRM_____ _____

9/13/63